Removal of a Bent Locked Intramedullary Nail from the Femur. A Case Report

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ABSTRACT

Introduction: The issue of deformation of a secured femoral intramedullary nail following recurrent injury is uncommon and can complicate standard removal procedures. The difficulty escalates in regions without specialised metal-cutting machinery.

Case Presentation: A 28-year-old woman sustained a left femoral shaft fracture following a road traffic accident in November 2025. She underwent open reduction and internal fixation using a hollow 9 × 360 mm stainless-steel locked intramedullary nail manufactured by Nebula Surgical Pvt. Ltd. She was discharged on the fifth postoperative day but subsequently fell at home and bent the implant. Radiographs demonstrated a 25° bend involving a 12.5 cm segment of the nail. Revision surgery was performed six months after the reinjury. A Gigli saw failed to create an indentation in the implant, while a giant rod cutter compressed and partially collapsed the nail without transecting it. A conventional hacksaw was then used successfully to divide and remove the nail. Revision fixation was performed using an 11 × 375 mm stainless-steel locked intramedullary nail from the same manufacturer.

Discussion: There is no singular method that reliably succeeds in extracting a deformed femoral nail. The consecutive malfunction of a Gigli saw and a large rod cutter in the same patient illustrates the necessity for the correct type of saw suited to the specific implant and the readiness of an alternative saw. Manual hacksaw transection is laborious, however economical, manageable, and does not necessitate the use of powered tools.

Conclusion: In instances where alternative tools are inadequate, a traditional hacksaw can serve as an efficient instrument for the transection of a bent, locked femoral nail. Diligent exposure, safeguarding of sensitive tissues, irrigation, and extraction of metallic fragments are crucial.

Keywords: implant distortion, corrective stabilisation, manual severance, resource-constrained surgery, orthopaedic injury, metallic residue.

INTRODUCTION

The primary surgical intervention for the majority of femoral shaft fractures in adults is locked intramedullary nailing, which provides stable load-sharing fixation and facilitates prompt rehabilitation.[1,2] While implant-related failures are infrequent, a documented yet technically demanding consequence of locked intramedullary nailing is the bending of the nail in situ following a subsequent stressful incident.[3]

A bent nail cannot be extracted from the identical aperture it was inserted into, as the bent section of the nail will not accommodate the medullary canal. Numerous techniques have been documented: closed or open alignment, partial reduction, total severance utilising burrs or cutting discs, giant cutters, and manual metal saws.[3-5] None of these techniques have gained universal endorsement, and the choice will differ based on the degree and orientation of the angulation, the characteristics of the fracture, the design and material of the nail, as well as the instruments employed and the surgeon's proficiency.[3-5]

The difficulty is amplified in resource-limited centres, where specialised extraction and metal-cutting equipment may not be readily available. Although hacksaw-assisted transection of bent femoral nails has previously been

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described, the uniqueness of this case lies in the sequential failure of a Gigli saw and a giant rod cutter before successful transection with a conventional hacksaw. This report therefore demonstrates the practical value of preparing alternative cutting instruments when removing a resistant bent intramedullary nail. The case is reported in accordance with the SCARE 2023 guideline.[10]

Case Presentation

In November 2025, a 28-year-old woman sustained a fracture of the shaft of the left femur following a road traffic accident. Initial radiographs demonstrated a displaced femoral shaft fracture. She underwent open reduction and internal fixation using a 9 × 360 mm stainless-steel locked femoral intramedullary nail manufactured by Nebula Surgical Pvt. Ltd. Her immediate postoperative recovery was satisfactory, and she was discharged home on the fifth postoperative day.

Following discharge, she fell at home and sustained a second injury to the operated limb. Radiographs demonstrated bending of the intramedullary nail at approximately the fracture site. The nail had a 25° angulation, with the bent segment measuring approximately 12.5 cm. Revision surgery was performed six months after the reinjury. The technical difficulty of implant removal, the possible need for multiple cutting techniques and the need for revision fixation were discussed with the patient.

During revision surgery, the locking screws were removed as needed and the apex of the bent nail was exposed via a direct lateral approach. All soft tissues around the area were retracted and protected. A Gigli saw was originally run around the nail. This was not successful as repeated reciprocating movements were not able to make a meaningful indentation.

Then a giant rod cutter was used on the exposed implant (Fig. 2A). The force applied by the cutter was enough to compress and partially transect the nail, but not enough to transect it. Further application was thought to potentially cause further distortion without safe division of the implant.

A standard metal cutting hacksaw was then used under direct vision. Manual sawing was done under control and gradually a groove was formed and then the nail was cut. The separated implant parts were removed and the operating area was irrigated with saline to remove any visible metallic fragments (Fig. 2B–D). Revision fixation was performed using an 11 × 375 mm stainless-steel locked intramedullary nail manufactured by Nebula Surgical Pvt. Ltd.**,** as demonstrated on the immediate postoperative radiographs (Fig. 3).

Early postoperative period was satisfactory.

DISCUSSION

Bent femoral nails generally arise after recurrent injury prior to the full healing of the fracture. A sufficiently robust secondary force may induce plastic deformation of the nail rather than fracture; once bent, the nail is typically irretrievable by conventional methods, and any vigorous effort to extract it could lead to additional comminution, cortical injury, and damage to soft tissues.[1-4]

While closed straightening may appear appealing because to its avoidance of more exposure, it frequently proves ineffective and can exert detrimental stresses on the knee, fracture fragments, and adjacent tissues.[3,11] In the most extensive systematic study conducted, the majority of patients ultimately required a more intricate open procedure, with metal cutting burrs or drill bits utilised in around two-thirds of reported cases.[3]

Open transection provides direct visualisation and protection of neighbouring structures. Powered equipment, such as diamond-tipped discs, may not be available and can heat and scatter metal particles[9], although jumbo cutters have been reported to be successful.[7,8] Manual hacksaw techniques have also been reported as cheap alternatives.[6,12]

The important contribution of this case is not the use of a hacksaw alone, as this method has previously been reported. Rather, it is the sequential failure of two other readily available instruments before successful hacksaw

transection of the same implant. The Gigli saw failed to create an indentation in the 9 mm stainless-steel nail, while the giant rod cutter compressed and partially collapsed the implant without completely dividing it. The conventional hacksaw subsequently achieved progressive and controlled transection. This experience demonstrates that the apparent strength of a cutting instrument does not necessarily guarantee successful division of a resistant intramedullary implant.

The hacksaw worked because it cut metal one piece at a time. The benefits are low cost, easy to obtain, no electricity needed and direct control of the cutting plane. Its disadvantages are the need for adequate exposure, physical effort and time. To protect the soft tissues, to reduce heat transfer and to gather metal filings, moist swabs, retractors, irrigation and suction should be used.[6,9,12]

The main limitation of this report is that this is a single case and does not establish the superiority of hacksaw transection over other removal techniques. However, the reported sequence offers a reliable rescue for surgeons who do not have specific extraction tools available.

CONCLUSON

A bent locked femoral intramedullary nail may prove difficult to remove using various extraction techniques. A Gigli saw failed to create an indentation in the implant for this patient, necessitating the use of a giant rod cutter to compress the implant without severing it. The division was executed using a standard hacksaw, followed by its removal. Surgeons should have access to alternative cutting instruments, and emphasis must be placed on safeguarding soft tissues and removing debris.

Informed Consent:

Written informed consent was obtained from the patient for publication of this case report and the accompanying anonymised radiographs and intraoperative images.

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APPENDIX

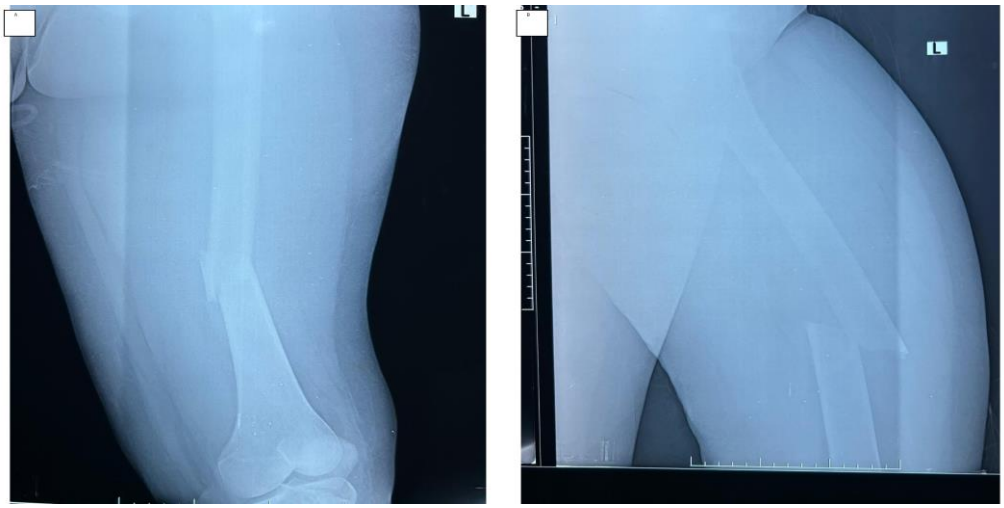

Figure 1: Initial radiographs of the left femur before index fixation. (A) Anteroposterior view. (B) Additional view demonstrating the displaced femoral shaft fracture. Patient identifiers have been removed.

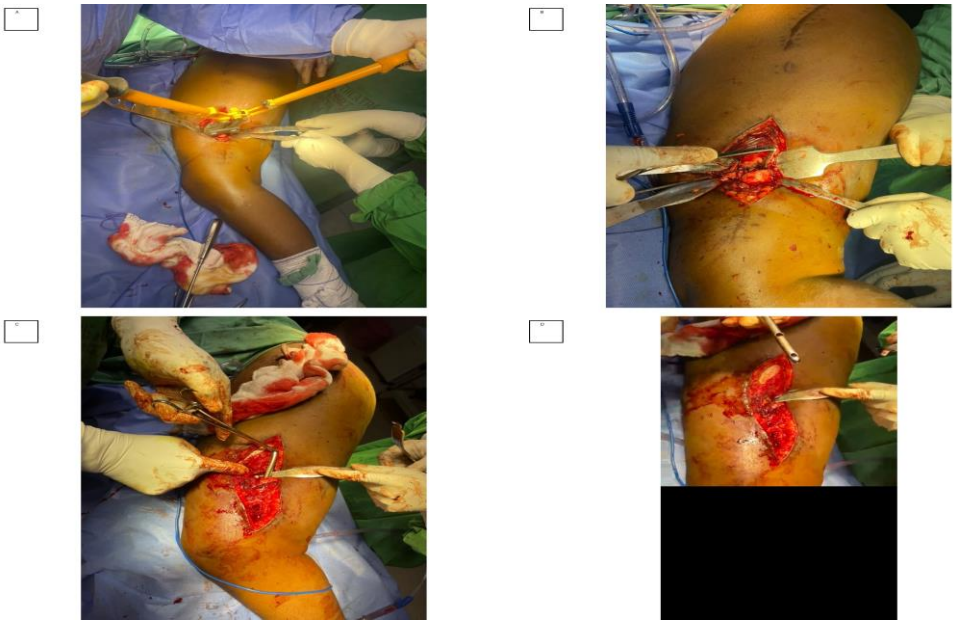

Figure 2: Intraoperative images during removal of the bent locked intramedullary nail. (A) Giant rod cutter applied to the exposed nail. (B) Exposure of the deformed implant during the sequential cutting attempts. (C)

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Manipulation of the nail after incomplete collapse by the cutter. (D) Operative field after successful manual transection and removal of the divided implant segment. The panel descriptions should be checked against the operative record before submission.

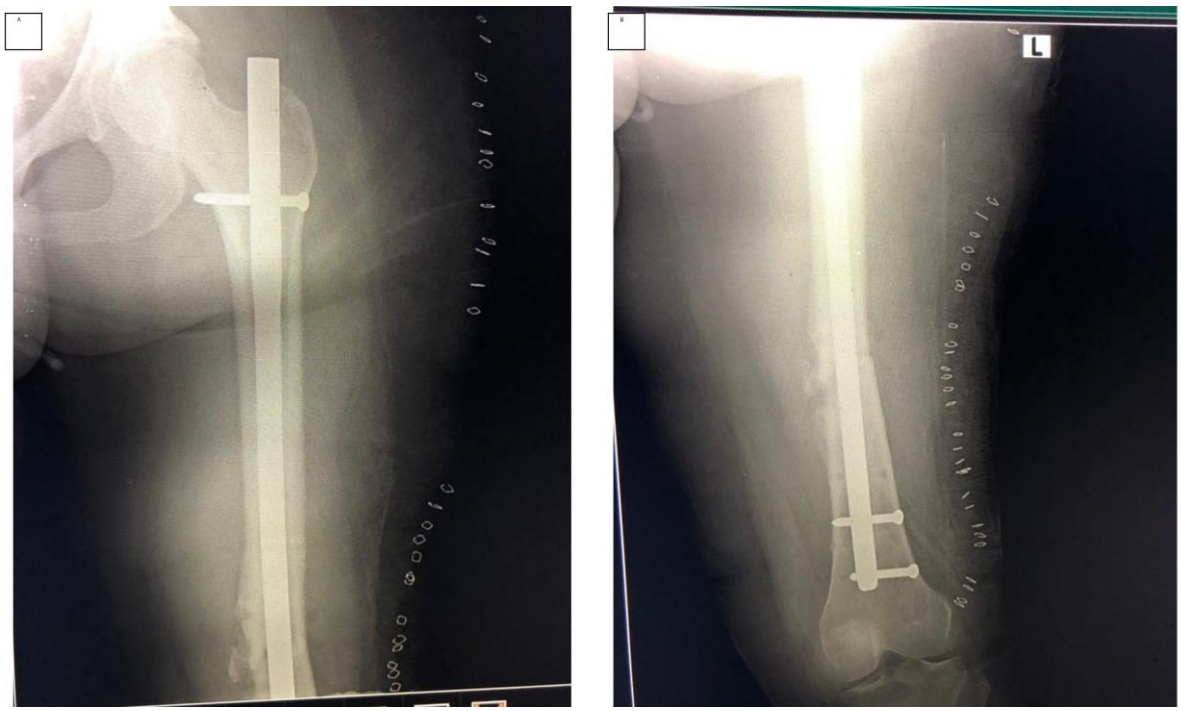

Figure 3: Immediate postoperative radiographs following removal of the deformed implant and revision locked intramedullary fixation. (A) Long-segment view. (B) Distal femoral view.